Replace by Art 34

CLAIMS

1. An electric power plant comprising at least one electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding of the machine (2, 4, 6, 8) comprises at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and also in that auxiliary power means (10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40) are arranged to provide the requisite auxiliary power.

2. A plant as claimed in claim 1, **characterized** in that the potential on the first layer is substantially equal to the potential on the conductor.

3. A plant as claimed in claim 1 or claim 2, **characterized** in that the second layer is arranged to form a substantially equipotential surface surrounding the conductor.

4. A plant as claimed in claim 3, **characterized** in that the second layer is connected to a predetermined potential.

5. A plant as claimed in claim 4, **characterized** in that said predetermined potential is earth potential.

6. A plant as claimed in any of the preceding claims, **characterized** in that at least two adjacent layers of the machine's winding have substantially equally large coefficients of thermal expansion.

7. A plant as claimed in any of the preceding claims, **characterized** in that the conductor comprises a number of strands, at least some of which are in electric contact with each other.

8. A plant as claimed in any of the preceding claims, **characterized** in that each of said three layers is firmly joined to adjacent layers along substantially its entire contact surface.

9. A plant as claimed in any of the preceding claims, **characterized** in that said layers are arranged to adhere to each other even when the insulated conductor is bent.

10. An electric power plant comprising at least one electric machine of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one magnetic core and at least one electric winding, **characterized** in that the winding is formed from a cable comprising one or more current-carrying conductors, each conductor having a number of strands, an inner semiconducting layer provided around each conductor, an insulating layer of solid insulating material provided around said inner semiconducting layer, and an outer semiconducting layer provided around the insulating layer, and in that auxiliary power means are arranged to provide the requisite auxiliary power.

11. A plant as claimed in claim 10, **characterized** in that said cable comprises a sheath.

12. A plant as claimed in any of claims 1-11, **characterized** in that the electric machine is a rotary electric machine and in that the stator is provided with at least two windings designed for different voltages, one of which windings is arranged as auxiliary power winding to generate auxiliary power.

13. A plant as claimed in claim 12, **characterized** in that the auxiliary power winding comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer and a second layer with semiconducting properties surrounding the insulating layer.

14. A plant as claimed in claim 12 or claim 13, **characterized** in that one stator winding (6) is dimensioned for voltages in the range of 36 kV - 800 kV, whereas the auxiliary power winding (22) is dimensioned for voltages in the range of 400 V - 20 kV.

15. A plant as claimed in any of claims 12-14, **characterized** in that the auxiliary power winding (22) is dimensioned to supply voltage within one of the following discrete voltage ranges: 380-420 V, 650-725 V, 3.1-3.5 kV, 6.2-7.0 kV or 9.5-10.5 kV.

16. A plant as claimed in any of claims 12-14, **characterized** in that the auxiliary power winding (22) is dimensioned to supply a voltage arranged to be transformed to a voltage within one of the following discrete voltage ranges: 380-420 V, 650-725 V, 3.1-3.5 kV, 6.2-7.0 kV or 9.5-10.5 kV.

17. A plant as claimed in any of claims 12-16, **characterized** in that the auxiliary power winding (22) is a three-phase winding.

18. A plant as claimed in any of claims 12-17, **characterized** in that the auxiliary power winding (22) is placed in the bottom of a slot (7) formed between two adjacent stator teeth (4).

19. A plant as claimed in claim 18, **characterized** in that the auxiliary power winding (22) is placed in an extra winding space (23) in the stator (1), oriented radially in relation to the stator winding (6).

20. A plant as claimed in claim 18 or claim 19, **characterized** in that the auxiliary power winding (22) is placed in every slot (7) in the stator (1).

21. A plant as claimed in any of claims 1-11, **characterized** in that the electric machine is a generator and in that the auxiliary power means comprise a tapping terminal on the generator winding for tapping auxiliary power, to form an auxiliary power source.

22. A plant as claimed in any of claims 1-11, **characterized** in that the auxiliary power means comprise as an auxiliary power source a separate auxiliary power generator, such as a synchronous machine or permanent magnet generator, driven by the electric machine.

23. A plant as claimed in claim 22, **characterized** in that the auxiliary power generator is provided with at least one winding comprising at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer and a second layer with semiconducting properties surrounding the insulating layer.

24. A plant as claimed in any of claims 1-11, **characterized** in that the auxiliary power means comprise as auxiliary power source an extra secondary winding of an earthing transformer connected to a busbar for several generators.

25. A plant as claimed in any of claims 1-11, **characterized** in that at least one of the windings of an earthing transformer connected to a busbar for several generators is provided with a tapping terminal for extracting auxiliary power.

26. A plant as claimed in claim 24 or claim 25, **characterized** in that at least one of the transformer's windings comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer and a second layer with semiconducting properties surrounding the insulating layer.

27. A plant as claimed in any of the preceding claims, **characterized** in that the auxiliary power means comprise at least one auxiliary power source which is connected to an auxiliary power busbar for distribution of auxiliary power, via power electronics equipment to keep the voltage on the auxiliary power busbar constant, the power electronics equipment being provided with a direct voltage intermediate link, to which a back-up voltage can be connected if necessary.

28. A plant as claimed in claim 27, **characterized** in that a battery is connected to the direct voltage intermediate link to supply a predetermined back-up voltage to the direct voltage intermediate link if its voltage level falls below said predetermined level.

29. A plant as claimed in claim 27 or claim 28, **characterized** in that the power electronics equipment comprises an input stage for rectifying alternating voltage obtained from the auxiliary power source, for generation of a direct voltage on the intermediate link in the power electronics equipment.

30. A plant as claimed in claim 29, **characterized** in that the input stage comprises a diode bridge.

31. A plant as claimed in claim 29, **characterized** in that the input stage and an output stage included in the power electronics equipment each comprise a converter equipment.

32. A plant as claimed in claim 29, **characterized** in that the input stage is designed to generate a direct voltage on the intermediate link, with a load-dependent voltage level.

33. A plant as claimed in claim 32, **characterized** in that the input stage comprises a resistor and an inductor to produce a load-dependent voltage drop.

34. A plant as claimed in claim 33, **characterized** in that the input stage is so designed that, when the maximum permitted current is supplied, the voltage on the direct voltage intermediate link lies below said back-up voltage.

35. A plant as claimed in any of claims 27-34, **characterized** in that a plurality of generators with extra windings for generating auxiliary power are connected in parallel to the direct voltage intermediate link, each via its own input stage in the auxiliary electronics equipment.

36. A plant as claimed in any of claims 27-35, **characterized** in that the auxiliary power busbar can be supplied from additional sources, such as external supply sources or generators driven by diesel engines.

37. A plant as claimed in any of claims 27-36, **characterized** in that at least one alternating voltage busbar and at least one direct voltage busbar for distributing auxiliary power are supplied both from a battery and from the auxiliary power busbar via a converter or from the intermediate link of the power electronics equipment.

38. A plant as claimed in claim 12 or claim 13, **characterized** in that the rotary electric machine is arranged to be excited from the auxiliary power winding.

39. A plant as claimed in any of claims 27-37, **characterized** in that the electric machine is arranged to be excited with the aid of a chopper circuit, the input and output being galvanically separated and the input being connected to the direct voltage intermediate link.

40. A plant as claimed in claim 22 or claim 23, **characterized** in that the auxiliary power generator is connected to an auxiliary power busbar, and in that an integral motor is arranged to keep the speed of the auxiliary power generator constant when variations appear in the voltage and/or frequency of the supply network.

41. A plant as claimed in claim 22 or claim 23, **characterized** in that the power electronic equipment is arranged for optional control of power flow from

auxiliary power generator to auxiliary power busbar or from auxiliary power busbar to auxiliary power generator.

42. A plant as claimed in claim 41, wherein the electric machine is a synchronous machine, **characterized** in that the field winding of the auxiliary power generator can be short-circuited and in that its stator side can be supplied with a three-phase voltage having a phase position and a frequency, such that the auxiliary power generator functions as an asynchronous machine with direction of rotation for maximum braking torque.

43. A plant as claimed in claim 41, wherein the electric machine is a synchronous machine, **characterized** in that the field winding of the auxiliary power generator can be short-circuited and in that at least one stator winding in the auxiliary power generator can be supplied with a direct current.

44. A plant as claimed in claim 43, **characterized** in that a frequency changer or a separate thyristor current converter for single-quadrant operation is arranged to supply at least one stator winding of the auxiliary power generator with direct current.

45. A plant as claimed in any of claims 41-44, **characterized** in that the auxiliary power generator is designed with a pole number suitable for frequency adaptation.

46. A plant as claimed in claim 12 or claim 13 **characterized** in that the power electronics equipment is arranged for optional control of power flow from auxiliary power winding to auxiliary power busbar or from auxiliary power busbar to auxiliary winding.

47. A plant as claimed in claim 46, wherein the electric machine is a synchronous machine, **characterized** in that the field winding of the machine can be short-circuited and in that its auxiliary winding can be supplied with a three-phase voltage having a phase position and a frequency, such that the synchronous machine functions as an asynchronous machine with a direction of rotation for maximum braking torque.

48. A plant as claimed in claim 46, wherein the electric machine is a synchronous machine, **characterized** in that the field winding of the machine can be

short-circuited and in that at least one of its auxiliary windings can be supplied with direct current.

49. A plant as claimed in claim 46, wherein the electric machine is a synchronous machine, **characterized** in that a frequency changer or a separate thyristor current converter for single-quadrant operation is arranged to supply an auxiliary power winding in the machine with direct current.

50. A plant as claimed in any of claims 27-37 **characterized** in that the electric machine is arranged to be excited from a separately driven auxiliary power generator.

51. A plant as claimed in any of claims 17-21, 22 or 23, **characterized** in that an auxiliary power generator or generator with auxiliary power winding is connected to an auxiliary power busbar, and in that actual loads are connected to integral motors, the speed being kept constant when variations occur in the voltage and/or frequency of the supply network.

52. A plant as claimed in any of claims 1-24, **characterized** in that the machine with auxiliary power winding, connected to an auxiliary power busbar, can be driven in three simultaneous operation modes, namely a synchronous motor mode for driving a turbine part in air or vacuum, a synchronous compensator mode for generating reactive power for maintaining the voltage on the external network, and a transformer mode for transmitting power to the auxiliary power busbar.

53. A plant as claimed in any of claims 1-24, **characterized** in that the machine with separate auxiliary power generator, connected to an auxiliary power busbar, can be driven in three simultaneous operation modes, namely a synchronous motor mode for driving a turbine part in air or vacuum, a synchronous compensator mode for generating reactive power for maintaining the voltage on the external network, and a transformer mode for transmitting power to the auxiliary power busbar.

54. A procedure in an electric power plant comprising at least one rotary electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconduct-

ing properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that auxiliary power is generated with the aid of an extra winding on the stator.

55. A procedure in an electric power plant comprising at least one electric machine (2, 4, 6, 8) of alternating current type in the form of a generator, designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that auxiliary power is tapped from a tapping terminal on the generator winding.

56. A procedure in an electric power plant comprising at least one electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that a separate auxiliary power generator is driven by the electric machine.

57. A procedure in an electric power plant comprising at least one electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, as well as an earthing transformer connected to a busbar intended for several generators, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that auxiliary power is extracted from an extra secondary winding of the earthing transformer.

58. A procedure in an electric power plant comprising at least one electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric

winding, as well as an earthing transformer connected to a busbar intended for several generators, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that auxiliary power is tapped from a tapping terminal of a transformer winding.

59. A procedure in an electric power plant comprising at least one rotary electric machine (2, 4, 6, 8) of alternating current type designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, as well as an auxiliary power generator connected to an auxiliary power busbar, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that the power flow is controlled optionally from the auxiliary power generator to the auxiliary power busbar or from the auxiliary power busbar to the auxiliary power generator.

60. A procedure in an electric power plant comprising at least one synchronous machine (2, 4, 6, 8) designed to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding of the machine (2, 4, 6, 8) is formed of at least one electric conductor (35), a first layer (13) with semiconducting properties surrounding the conductor, a solid insulating layer (37) surrounding the first layer and a second layer (15) with semiconducting properties surrounding the insulating layer, and in that the field winding of the machine is short-circuited and an auxiliary winding of the machine is supplied with a three-phase voltage having a phase position and a frequency such that the machine functions as an asynchronous machine with a direction of rotation for maximum braking torque.